What Lies Beneath:

Host Server Provisioning, Monitoring, and Management Using Oracle Enterprise Manager Grid Control

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INTEGRATED HOST PROVISIONING, MONITORING, AND MANAGEMENT:

MAKING YOUR LIFE EASIER

With the array of available server platforms, it becomes more and more complex for system administrators to maintain the operating systems and hardware for the server, or host, on which Oracle software runs. With Enterprise Manager Grid Control, as soon as a Management Agent is deployed to the host, Grid Control automatically starts monitoring alert and configuration information for that machine.

Anyone who requires host information benefits from Grid Control's host provisioning, monitoring, and management features:

- System administrators responsible maintaining a healthy OS and hardware environment

- DBAs and applications administrators that benefit from being able to monitor, diagnose, and report-on their host environment in the context of their application

Host management allows users to:

- Analyze performance trends for host hardware to predict future performance

- Measure service levels by monitoring host performance in real-time

- Validate software and hardware configuration across the enterprise

MANAGING HOST DEPLOYMENTS

Enterprise Manager is more than a simple host status monitoring tool. Enterprise Manager allows you to manage hosts across their lifecycle, starting with host deployment. Use Enterprise Manager Grid Control's deployment management tools to:

- Deploy new hosts using the provisioning facility

- View and compare host configurations

- Perform automated patching for your hosts

Provisioning the Operating System

Operating system provisioning is the simplest way to deploy stable, high-performing, cost-effective systems. Enterprise Manager Grid Control provides "bare-metal" provisioning of the Linux operating system using a standardized PXE booting process. The provisioning application also facilitates the deployment of additional software on top of the operating system. Grid Control provisioning is template-based and can assign hardware profiles, storage layouts, and network configurations to the new machines. You can also use vendor-provided scripts to provision third-party hardware, such as storage disks or load balancers.

Provisioning from the Software Library

The Software Library is a centralized repository of software images and scripts that forms the core of Enterprise Manager's ability to automate Change and Release Management practices. These images and scripts can be versioned and marked with different maturity levels, so that the ones that are ready to be rolled out can be used for provisioning in a repeated fashion. The images can be sourced whether from the software media or from an already installed reference host, thereby offering flexibility and choice.

You can use the provisioning application to put together a default image of the minimum set of software packages required to provision a bare-metal hardware server. The provisioning application uses the Enterprise Manager Grid Control Job System to stage the default image onto the staging server in preparation for installation. The default image can be installed on any new machine that boots over the network. When a new machine is plugged in and the network booted, the boot server directs the machine to install the specified default image. After installation, the hardware server is configured with the operating system defined in the default image. Provisioning also deploys a Management Agent to the new hardware server so that it can communicate with the central Management Service.

Figure 1 Provisioning Software Library

ORACLE Enterprise Manager 10g
Grid Control

Setup Preferences Help Logout

Home | Targets | Deployments | Alerts | Policies | Jobs | Reports

General | Provisioning

Provisioning

Provision a full stack of software from the operating system up to the application, onto a hardware server.

Page Refreshed **October 10, 2005 9:46:55 AM PDT** (Refresh)

Components | Directives | Networks | Images | Suites | Assignments | Hardware | Cluster | Suite Instance | Administration

Define and configure the set of software components that may be included in an image.

View [Latest Version ▾] (Go) Advanced Search

(View) (Edit) (Activate) (Deactivate) (Delete) (Promote) (Demote) (Create Folder) (Create Component)

Select	Name	Type	Revision	Status	Maturity	Product name	Product version	Description
○	▼ Components							Components
○	▶ App Server Gold Images							iAS components certified for redeployment
○	▶ Clusterware Gold Images							Clusterware components certified for redeployment
○	▼ Database Gold Images							Database components certified for redeployment
⦿	Oracle DB 10g - 10.2	Oracle Database Clone	0.2	Active	Beta	Oracle DB	10.2.0.1	
○	Oracle DB 9i	Oracle Database Clone	0.1	Active	Production	Oracle DB	9.2.0.4	Production db for sales team
○	▶ Disk Layouts							Disk layout library
○	▶ Hardware Profiles							Hardware profile library
○	▼ Home-Grown Application Gold Images							Home-grown app components certified for redeployment
○	Sales Tracking Application	Generic Component	0.1	Active	Production	SalesApp	3.0	Used by Jim's team
○	Sales Tracking Application (older version)	Generic Component	0.1	Ready	Production	SalesApp	2.2	Used by Jim's team prior to systems update
○	▶ OS Gold Images							Operating system components certified for redeployment

(View) (Edit) (Activate) (Deactivate) (Delete) (Promote) (Demote) (Create Folder) (Create Component)

Components | Directives | Networks | Images | Suites | Assignments | Hardware | Cluster | Suite Instance | Administration

Home | Targets | Deployments | Alerts | Policies | Jobs | Reports | Setup | Preferences | Help | Logout

Cloning Gold Images

Cloning is an effective way to deploy tested and approved software images (commonly referred to as "gold images") from either a reference host or the centralized software library. You can use cloning to standardize the deployment of Oracle Database and Oracle Application Server instances—in both clustered and non-clustered environments.

For Oracle Application Server environments, the cloning feature has been enhanced to handle different types of middle-tier installations, including J2EE and WebCache, Portal and Wireless, and Business Intelligence middle tiers. Cloning allows you to deploy pre-patched software to multiple hosts in an efficient and scalable way.

One of Enterprise Manager Grid Control's most powerful features is the ability to create and extend Oracle Real Application Clusters and Oracle Application Server Cluster environments. From a single gold image of Oracle Clusterware and a single gold image of Oracle Real Application Clusters, you can build new clusters or add nodes to existing clusters. You can also easily convert a single instance database to a RAC database. Similarly, you can extend middleware by cloning application servers.

HOST CONFIGURATION & PATCHING

Host Configuration Page

In order to efficiently manage the growing complexity in your data center, you have to know what you have installed. Oracle Enterprise Manager provides you with

extensive host configuration information out of the box. The Host Configuration page lists not only operating system and hardware configuration information, but all Oracle software and operating system registered software on the host as well. You can also compare configurations for single or multiple hosts to identify potential differences that might indicate a problem.

Operating System Configuration Details

Enterprise Manager Grid Control collects key operating system-level information for hosts. You can obtain general information about the operating system, such as the distributor and the version. You can also drill-down for specific information such as system properties, file systems, and operating system-level packages. This information helps when troubleshooting performance problems that arise because of configuration issues.

Figure 2 Host Operating System Details Page

- The File Systems page includes information about the various mount points for the host, type of mount point, time of the mount, and the directory where the file system is mounted.

- The Packages page lists all of the operating system packages installed on the host.

Hardware Configuration Details

The Hardware Details page allows you to view the CPU, I/O, and Network Interfaces associated with the host. It also helps the user keep track of the hardware

changes that occur over time. The type of operation (INSERT, UPDATE, or DELETE) and the category of the hardware that is updated are reflected on this page.

Figure 3 Host Hardware Details Page

Patching Linux Hosts: Keeping Your Configuration Up To Date

To use the Linux OS patching feature, make sure you have the following:

- **Licenses for the Oracle Database Configuration Pack or Oracle Application Server Configuration Pack**
- **License for the Oracle Provisioning Pack**

The "Patch Linux Hosts" tool, a powerful feature in Enterprise Manager Grid Control, facilitates the automated management of Linux hosts in an enterprise. Use this feature to keep the Linux hosts in your enterprise up to date with vital software updates from your Linux vendor.

Patch Linux Hosts uses a reference-based group patching model, where you can create one or more reference package repositories containing up-to-date versions of various packages, and associate a group of Linux hosts with these package repositories. The Patch Linux Hosts tool uses package repositories to patch the hosts as well as to monitor the deviation of the packages installed on the hosts. You can create different groups suited to your administrative needs and even associate different package repositories with different priorities for each group. You can independently control when and how often to update the hosts in the group, and how to determine their compliance with respect to the package repositories.

Some additional patching features include:

- **Linux Host Patching Groups**: You can group a set of Linux hosts together to update all at once. Each group is associated with one or more

package repositories that contain all the certified and appropriate versions of the software packages for the hosts of that group. Each group is configured with an update schedule for a recurring job to run to update the hosts with the associated package repositories.

- **Compliance**: The compliance page contains information on the number of hosts in a group that are in compliance, as well as the number of "rogue" packages on a particular host. You can see metrics and charts to measure compliance for all Linux Host Patching Groups, as well as historical compliance data.

- **Emergency Patching**: This feature gives you the option of performing "forced" updates, outside of the established schedule, to immediately respond to critical bugs or security alerts for all configured Linux hosts.

- **Undo Patching**: This features adds flexibility by allowing you to roll back software to its previous stable version, or even de-install the unstable version completely if that software version was found to be unsuitable or to have a bug or security vulnerability.

MONITORING HOSTS

Once you have deployed your host systems and brought them up to the standard patch level, your focus will turn to system monitoring and on-going administration. Enterprise Manager Grid Control can help.

As with other managed targets, Enterprise Manager Grid Control's full suite of monitoring features are available for hosts including the following:

- Alerts: raise alerts when key metrics cross threshold values

- Custom notifications: email and page key personnel on alerts

- Blackouts: schedule a halt to alerts and notifications during planned maintenance windows to prevent unnecessary messages and to prevent planned down time from affecting your service uptime data.

- Corrective actions: automatically perform actions in response to alerts to potential correct incidents without manual intervention

- Monitoring templates: apply monitoring settings to groups of hosts at the click of button

These features and more allow you to manage your host servers in the same manner that you would any other database or application in your enterprise using Enterprise Manager Grid Control, minimizing training requirements, speeding incident resolution across the layers of the data center, and maximizing service availability.

Status & Availability At A Glance: The Host Home Page

Grid Control consolidates the relevant host information into a convenient single-screen Host Home page. The Host Home page provides an overview of the status and vital statistics for each host that is part of the Enterprise Manager Grid Control environment.

You can see the availability, key configuration information, and outstanding alerts, as well as other pertinent information about the host. Convenient links allow you to view all the metrics collected for the host, change the thresholds as appropriate, or directly log in to the host to perform administrative actions.

Using the Host Home page, you can do the following:

- Drill down to view detailed metrics

- View operating system, hardware, and other configuration information for the host

- View policy violations and alerts for the host

- Analyze the job activity

- Determine whether there are outstanding patch advisories

- Determine the last security evaluation of the host

- Navigate to other pages to help you investigate the health of the host

Figure 4 Host Home Page

HOST FAULT MONITORING

The host server hardware and operating system are key resources to your applications and databases so knowing the host status at all times is essential to maximizing application performance and availability, as well as to anticipating any issues before they strike. Enterprise Manager Grid Control provides a variety of features designed to keep you up to date on the availability and fault status of your host.

Log File and Windows Event Log Monitoring

Enterprise Manager Grid Control monitors any Unix/Linux log files for the occurrence of patterns you specify that might indicate a fault condition has been recorded in the log files present on the host. For Windows Server systems, Enterprise Manager monitors the System and Security Event Logs for Warning and Error Events out of box.

With Enterprise Manager Log File Monitoring, files are periodically scanned for the occurrence of desired patterns and an alert is raised when the pattern occurs during a given scan. During a scan, new content created since the last scan is searched for the occurrence of the desired patterns. From the Log File Monitoring page, you can also view, clear, and purge open alerts generated during log file monitoring.

File and Directory Monitoring

File and Directory Monitoring is useful to an administrator that needs to monitor the size of log files to be alerted when the file reaches a size threshold and thus needs to be purged.

Enterprise Manager monitors the host files and directories you specify based on operator-specified criteria on hosts running various versions of the UNIX operating system.

With File and Directory Monitoring, administrators can monitor files and alert based on criteria related to the following:

- Permissions

- Size

- Rate of growth in size

Hardware Status Monitoring for Dell PowerEdge Systems

Hardware-specific monitoring is available out-of-box for Dell PowerEdge Linux hosts with Dell OpenManage software using Oracle Enterprise Manager. The following hardware health statistics can be monitored as part of the Dell PowerEdge Linux host target:

- Processor Status

- Memory Status

- PCI Device Status

- Power Supply Status

- System BIOS Status

- Fan Status

- Remote Access Card Status

- Temperature Probe Status

Hardware status monitoring for Dell PowerEdge systems allows you to rapidly identify and diagnose the source of potential problems threatening your host environment so you can take preemptive steps to avoid an unexpected outage.

HOST PERFORMANCE MONITORING

When an application appears to slow down over time, and users begin to complain, the source of the problem is often not immediately apparent: is it in software or hardware? With Enterprise Manager, system-, application, and database administrators have a centralized solution for looking at the whole stack – from the hardware and operating system up to the application service and everything in between to determine the potential source of performance issues.

For instance, Enterprise Manager can help determine the overall host loading and whether resources need to be added or redistributed across your enterprise. Enterprise Manager Grid Control contains a Host Performance page that provides an overview of the utilization statistics (CPU, Memory, Disk I/O, and Program

Resource Utilization) for an individual host. You can also view the top processes consuming the most CPU or Memory and take appropriate action.

The performance metrics that are collected out-of-box for the host span several different categories: CPU Usage (including idle, wait, and user times), Disk Activity (including Average Disk I/O rate), and Network Interface Activity, among others. You can also view real-time metrics such as buffer activity.

Using the Performance page, you can:

- View various utilization charts to get the big picture. Click a metric link to view the metric in more detail.

- View the processes that are using the most CPU or memory resources.

- View performance data in real-time, or historical data over defined periods to help you anticipate problems.

Figure 5 Host Performance Page
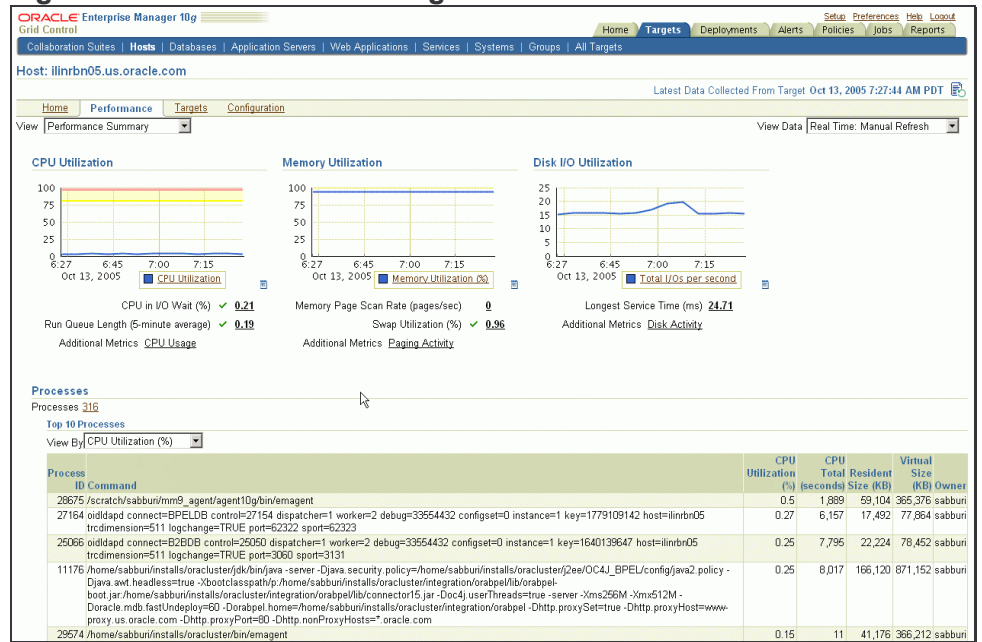
HOST RESOURCE UTILIZATION MONITORING

Not only does Enterprise Manager provide you with performance information about the host to help you plan and monitor capacity utilization, it allows you to go a step deeper and find out who or what is consuming CPU, memory, and storage resources to help you understand what is driving the underlying trends so you can plan ahead.

Program Resource Utilization Monitoring

Enterprise Manager allows you to track resource use for Unix programs and users. For example, you can track CPU usage by user, by program, or a combination of the two.

The Program Resource Utilization page provides a quick glimpse of the programs being monitored on this host. With this information, you can see trends in resource usage for:

- A specific program or set of programs
- A specific user or set of users
- A combination of programs and users

Storage Resource Utilization Monitoring

Tracking the storage resource allocation and usage is essential to large IT departments. Nowhere is this more critical than for database management. Unallocated and underutilized storage can be put to better use. Historical trends at a business entity-level enable you to plan for future growth before it becomes a problem.

Enterprise Manager presents you with detailed storage information at the individual Unix host level or you can take advantage of Enterprise Manager Groups to roll-up statistics across a collection of host systems.

The Storage Details page displays the following charts for status at a glance:

- **Overall Utilization**: Shows summary attributes that provide a system-level view of storage resource utilization.
- **Provisioning Summary**: Shows allocation-related summary attributes for File Systems, ASM, Volumes, and Disks for the associated hosts.
- **Consumption**: Shows usage-related summary attributes for Databases and File Systems.

Additionally, you can navigate to more details at the disk level to view the allocated and unallocated storage for all the disks and disk partitions on a host. All disks are listed, including virtual disks from external storage systems.

Figure 6 Host Storage Details Page
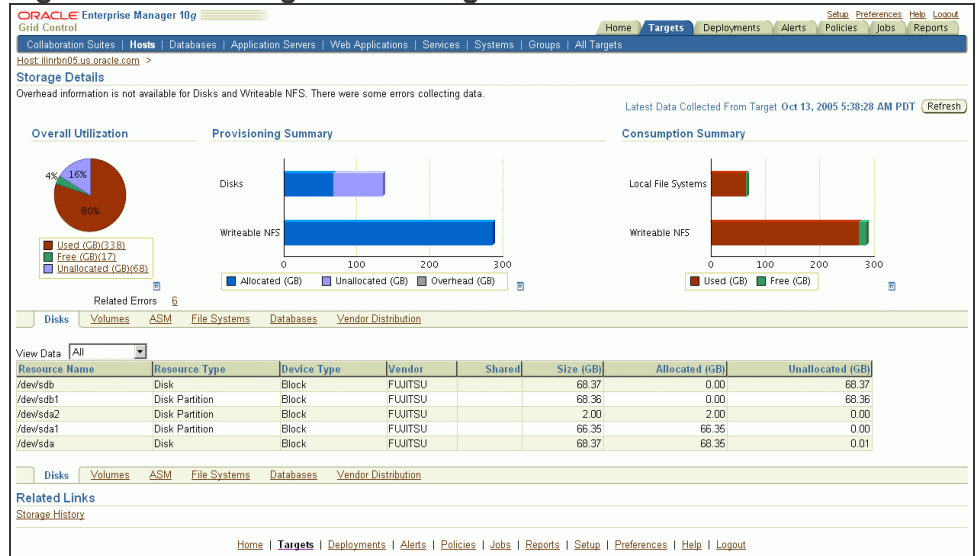
LINUX HOST ADMINISTRATION

In addition to using Enterprise Manager Grid Control to manage your databases and applications, you can also administer your host servers using tools designed specifically for host server management.

Administer Your Environment: Core OS Services and Resources

As a database or applications administrator, it is important to be able to set-up your host environment quickly and easily without having to bother other Administrators to get the job done. Further, being able to use a single, centralized console makes getting up and running faster and less error prone, whether setting up a server for the first time or trouble-shooting problems.

Planned for Enterprise Manager Grid Control 10gR2, easy to use Linux host administration features for RedHat and SuSE Linux provide you the ability to administer the host functions you care about most, allowing you to get your database or applications up and running in no time. With Enterprise Manager Grid Control Linux Administration, operators with the appropriate privileges can set up and administer the following OS features:

- **System Services**

  - Start/stop individual services: Facilitates upgrading and troubleshooting applications and databases

  - Configure services to run at boot time: Assure all your applications and dependent services are available after every reboot

  - Assign System Services to runlevels: Assure appropriate behaviors to assist in maintenance and trouble-shooting

- **Network Setup**

  - NFS Client Configuration: Configure access to storage resources

  - Network Card configuration: Rapidly establish connectivity to the network to get your application service running quickly

  - View/edit hostname lookup tables (/etc/hosts): Set-up and edit host names to identify new services to the network

- **User / Group Administration**

Remotely Execute Host Commands for a Server or Group

With the appropriate privileges, you can execute non-interactive host commands remotely over the network, as well as view and edit text files. The Execute Host Command page enables you to type operating system commands against one-, many- or all the hosts in a group, enabling you to perform multiple administrative operations at the same time.

Centrally Manage OS Jobs

You can leverage the Job System to run operating system commands for your host. Out of box, Enterprise Manager contains a Job Library with existing jobs that you can reuse and modify. Using Enterprise Manager's job system allows you to easily coordinate job activities not only across host servers, but also across the "stack" of software residing on the host, eliminating the need to keep track of jobs running from an external system or independently on the host itself.

Edit Host Files Remotely

Often, installing new software on a host requires the configuration of files on the host before and/or after the new software is installed. Using the Remote File Editor utility, you can update the contents of configuration files on the remote host from the Enterprise Manager console so that you don't have to use third party tools or bring up other windows or, even worse, have to go out and stand in front of the server console to get the job done.

INTEGRATED HOST MANAGEMENT WITH ENTERPRISE MANAGER

As data center architectures continue to shift towards the increasing use of web applications and service-oriented architectures (SOA), application service deployment has become increasingly complex, requiring ever larger numbers of servers specifically configured to host the application components. Getting these services up and running the first time, without any mistakes, and diagnosing problems rapidly if something goes wrong, means using integrated management solutions like Oracle Enterprise Manager Grid Control. Enterprise Manager centrally orchestrates provisioning and managing not only the applications and databases, but also the essential elements of their host environment, saving you and your company time and effort.

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